

Applic. No.: 10/686,849

Amdt. Dated January 17, 2006

Reply to Office action of October 14, 2005

REMARKS/ARGUMENTS

Reconsideration of the application is requested.

Claims 1, 5, 8-11, 15-29, and 32-37 remain in the application. Claims 1, 24, and 29 have been amended. Claims 2-4, 6-7, and 30-31 have been previously cancelled. Claims 12-14 have now been cancelled. Claims 24-29 and 32-37 have been previously withdrawn and rejoinder of method claims 24-29 and 32-37 has been requested.

In the section entitled "Claim Rejections - 35 USC § 103" on pages 2-4 of the above-mentioned Office action, claims 1, 5, and 8-23 have been rejected as being unpatentable over Sato et al. (US 6,440,828 B1) in combination with Cheng et al. (US 5,873,984) and Slater, Jr. et al. (US 2004/0171204 A1) under 35 U.S.C. § 103(a).

The rejection has been noted and claim 1 has been amended in an effort to even more clearly define the invention of the instant application. Support for the changes is found in original claims 12-14. Claims 12-14 have been cancelled.

Before discussing the prior art in detail, it is believed that a brief review of the invention as claimed, would be helpful.

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Claim 1 calls for, inter alia:

a semiconductor body of semiconductor material in a monocrystalline phase, said semiconductor body having one of a trench component and a planar component formed therein, said component being selected from the group consisting of a diode, a bipolar transistor, a MOSFET, and an IGBT;

a metalization layer formed of a metal selected from the group consisting of aluminum, chromium, and aluminum/chromium; and

a layer of said semiconductor material in a substantially amorphous phase disposed between said semiconductor body and said metalization layer, for forming an ohmic contact between said metalization layer and said semiconductor body;

said semiconductor material being silicon and said layer being a layer of amorphous silicon doped with hydrogen.

The invention of the instant application relates to a contact configuration for a semiconductor device in which a layer (2) is disposed between a monocrystalline semiconductor body (1) and a metalization layer (3) for forming an ohmic contact therebetween. The layer (2) is formed from the semiconductor body in an amorphous phase. The amorphous phase is formed of silicon so that amorphous silicon is used for the amorphous layer, which is doped with hydrogen.

As already discussed in the previous response, Sato et al. describe an ohmic contact having a metallization layer formed of titanium silicide on an amorphous silicon region, which was

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made amorphous by ion-bombardment and directly borders the silicon body (see the abstract).

Therefore, the invention of the instant application differs from Sato et al. in that the invention of the instant application contains the additional feature that the amorphous layer is doped with hydrogen. A good ohmic contact between the amorphous silicon and the semiconductor body as well as between the amorphous silicon and the metalization layer can be guaranteed through the doping with hydrogen (see the paragraph bridging pages 6 and 7 of the specification).

The Examiner has stated that Cheng et al. disclose doping with hydrogen. However, Applicants believe that the combination of Cheng et al. and Sato et al. is inappropriate because Cheng et al. relate a method for sputtering an amorphous carbon overcoat as a protective film on a magnetic recording disk and have nothing to do with a semiconductor device. Also, it can only be obtained from Cheng et al. that a doping with hydrogen serves for improving the mechanical properties in an amorphous carbon overcoat.

A person skilled in the art, when striving to improve the ohmic contact making between a metalization layer and a semiconductor body, would not consider any literature that

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concerns magnetic recording disks and their mechanical properties.

Although it is believed that the invention of the instant application is not obvious over a combination of Sato et al. and Cheng et al., claim 1 of the instant application has been amended to incorporate the additional "semiconductor features" of original claims 12-14 in order to emphasize the "distance" between the invention of the instant application and Cheng et al.

Finally, Slater, Jr. et al. describe a backside contact for vertical devices in which an ohmic contact making between an implanted silicon carbide and a deposited metal is produced. However, Slater, Jr. et al. do not deal with an amorphous layer formed of the material of the semiconductor body formed of silicon.

It is accordingly believed to be clear that none of the references, whether taken alone or in any combination, either show or suggest the features of claim 1. Claim 1 is, therefore, believed to be patentable over the art and since all of the dependent claims are ultimately dependent on claim 1, they are believed to be patentable as well.

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In view of the foregoing, reconsideration and allowance of claims 1, 5, 8-11, and 15-23 are solicited. Rejoinder of method claims 24-29 and 32-37 is requested upon allowance of product claims under MPEP 821.04 ("if applicant elects claims directed to the product, and a product claim is subsequently found allowable, withdrawn process claims which depend from or otherwise include all the limitations of the allowable product claim will be rejoined"). In fact, method claims 24-29 and 32-37 are ultimately dependent on claim 1.

In the event the Examiner should still find any of the claims to be unpatentable, counsel would appreciate a telephone call so that, if possible, patentable language can be worked out. In the alternative, the entry of the amendment is requested as it is believed to place the application in better condition for appeal, without requiring extension of the field of search.

If an extension of time for this paper is required, petition for extension is herewith made. Please charge any fees which might be due with respect to 37 CFR Sections 1.16 and 1.17 to

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the Deposit Account of Lerner and Greenberg, P.A., No. 12-  
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For Applicants

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